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AUTHOR McKee, John M.
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ABSTRACT

Establishing behavioral objectives for an adult basic education (ABE) program helps to accomplish individual assessment of a learner's abilities and deficiencies. The heart of an individually prescribed instructional system is the use of instruction materials or software. Many programmed instructional materials are available, and it is the responsibility of the administrator of adult educational programs to keep abreast of current materials. Hardware such as visual aids, tape recorders, and tachtiscopes may be used extensively for adult basic education, especially in reading programs. The integration of hardware and software into an ABE system, and the relations of materials and equipment and their consequences, call for contingency management techniques. The use of contingency or performance contracts is widely used in ABE. ABE instructors need to teach work and vocational programs as well as basic educational skills, especially in prisons. (RS)

HARDWARE AND SOFTWARE FOR ADULT BASIC EDUCATION IN CORRECTIONS*

John M. McKee
Rehabilitation Research Foundation
Draper Correctional Center

Educators for years have talked a game of individualized learning–now they're doing something about it! Previously they didn't know the rules of the game; they didn't have the instructional materials and equipment to accomplish it; and they lacked administrative and financial support for innovative changes in the way people acquire basic education skills.

Potentially effective "hardware" (teaching machines, multimedia instructional equipment) and "software" (paperbound texts and visuals) have been around for better than ten years, but only in the past three years have we learned how to maximize their use and how to evaluate them. Adult educators have now arrived at some definite criteria for the use and assessment of hardware and software in ABE programs.

The process by which educators developed a feasible way to systematically employ the hardware and software followed a series of sequential steps. A most significant and fundamental task was that of establishing behavioral objectives for an ABE program, which required a clear statement as to what the student should be able to *do* as a result of having been taught. Accomplishing this task led directly to an individualized assessment of the learner's deficiencies. The next step involved selecting materials and devising learning-management strategies that remedied these deficiencies. The final job was to devise ways of evaluating learner progress and achievement. To so quickly sum up the various stages of development–from establishing behavioral objectives to devising ways of evaluating learner progress–oversimplifies the extensive work that has gone into developing what is rapidly becoming a truly authentic learning system.

A learning system, in its best form, is a highly structured way of accomplishing a broad educational objective for all who are processed through it. Frequently called an

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individually prescribed instructional system–or IPI system–its principal objective is to pinpoint and correct academic deficiencies as determined, usually, by a normative diagnostic test. The system contains built-in controls over its operation (e.g., criterion-referenced tests, recording of individual and group performance, and systematic motivational procedures). The student's performance is almost continuously monitored, thereby allowing a learning manager to make periodic checks on an individual learner at any time. In addition to providing desirable individual evaluation, such feedback provides the learning manager corrective information for the overall system's improvement and further development.

The heart of the IPI System is the instructional materials–the software with which the learner interacts. To achieve maximum learning effectiveness, instructional products should lend themselves to individualization by allowing self-pacing by the student, active responding, frequent and immediate feedback on learning progress, and sequential arrangement of the subject matter into optimum learning steps.

Programmed instructional products best meet these criteria (McKee, 1971). Conventional textbooks, in contrast, hardly permit individualization; rather they promote a less effective method of teaching which often becomes a lock-step process. Moreover, to accomplish the objectives of individualized instruction, using conventional textbooks, considerable tutorial assistance must be provided to the student. This fact does not, however, preclude the use of good non-programmed materials; there are gaps in programmed materials (e.g., in current events) that can only be filled by other means.

Except for some gaps in special areas, programmed instructional products are overwhelmingly available on the commercial market. The Hendershot Bibliography (1968) lists hundreds of programs in dozens of subject areas, and more are pouring off the press daily. The problem facing the adult basic educator is one of *selection*. This task is time-consuming, complicated, and expensive and can be best performed by those learning centers which are sensitive to the need for evaluation-by-tryout. Catalogs and listings, even of national clearinghouses, offer little by way of critical evaluation of the materials they list; so, this task usually goes unattended. Some federal agencies, such as the U. S. Office of Education, and some universities which collect educational materials, periodically release evaluation reports–frequently recorded on checklist forms containing useful but insufficient data. Nor are state departments of education of great help. Frequently they approve materials, without the benefit of tryout and adequate sampling of materials available, often times within the constraints of politics and the pressures of product salesmen. Meanwhile, instructional products continue to be published at an ever-increasing rate.

Hopeless? Not quite. Administrators of adult basic education programs can be equipped to recognize and reject products that cannot fit into an individualized program. They can use a number of available resources, such as catalog listings, evaluation reports, clearinghouses, regional and state learning centers, and Area Manpower Institutes for Development of Staff. The adult education director should also subscribe to certain publications that can help him to stay abreast of advances in instructional products. Notable among such journals and magazines are *Educational Technology, Training in Business and Industry*, and the *NSPI Newsletter.* (A listing of resources and publications in adult basic education is attached to this paper.)

Toward Better Software

Many programmed instructional products are dull and colorless. They seem to be written by people whose only concern is to break all content down into "small steps"–no matter that the student is crushed by the monotony of it all. Such programmed texts are replete with simpleminded "copy frames" (Markle, 1969) requiring the learner of English usage to respond merely with the missing noun, verb, or adjective of the statement. Some programmers even have a "system" for "holing" a sentence, leaving out a noun first, then a verb, and finally an adjective or adverb.

While such programs can teach fairly effectively, learning adult education skills can be enhanced considerably by the extensive use of graphics, humor, color, and variety of style. When instructional materials are prepared with the effective use of these features, motivation or reinforcement becomes *intrinsic*, encouraging less dependence upon extrinsic or "synthetic" reinforcers. Most unimaginative programs follow a "linear frame" format and may contain thousands of sequenced statements with one or more blanks to be filled in by the student, usually on a separate sheet of paper. Shorter linear programs, requiring less than two hours to finish, are far better than the lengthy ones, in that they give the student a quicker sense of task completion and thus prevent the overwhelming feeling that there is no end in sight.

While linear programs constitute perhaps over 80 percent of all available programmed texts, a superior format is becoming increasingly common on the market. It combines the best features of the linear structure (e.g., *prompting* of responses, *fading* of cues, and *shaping* of the repertoire), liberally employs graphics and other forms of art work, and contains student validation data. Some of these types of programs, e.g., those of the Rehabilitation Research Foundation, follow the "Mathetical" system of behavioral

analysis (Gilbert, 1962) and are characterized by branching, discrimination and generalization training, and the requirement of student-constructed responses.

Vast numbers of programmed instructional products only require the student to discriminate between the correctness of one statement or word and another. These multiple choice discriminations are characteristic of intrinsic branching programs and many teaching machine programs which require the student to push one of several buttons for the correct response. Since this format is rigidly locked in, no allowance can be made for constructed responses, even though they may be obviously needed.

In summary, there are an increasing number of good software programmed texts appearing on the commercial market. Some have been prepared using behavior science principles. Some are flexible enough to permit individualization of instruction. The lengthy programs of the past are being replaced by shorter ones that permit a quick sense of task completion. Some programs of quality generate high interest–even excitement–in learning. Most programmers have so thoroughly mastered the process of establishing behavioral objectives that this operation can be hidden. More variable style, the use of color, and improved layout are common to the better programs.

Instructional Hardware

During the middle '60's teaching machines flourished. Since 1968 there has been a steady decline (except for computers) in their purchase and use. Many are sitting in storage closets. New personnel taking over programs are surprised to discover them and ask why they aren't being put to use.

The answer is known by anyone having lived through this era. First, machines were constructed by engineers and sold by manufacturers who knew little about how people learned. These entrepreneurs merely wanted to cash in on the "education revolution." When educators asked the salesmen how many programs existed for them, beyond the demonstration one, they quickly learned to say, "The best thing about this machine is that you can write your *own* programs–fill in the instructional gaps as *you* see them." A few more machines were sold by this gimmicky statement. Then the user discovered how expensive and how punishing it was to "write your own." At that point, machines, programmed instruction, and the education revolution were shelved, and a wave of cynicism set in. At this time, too, software production came close to shutting down. Programming firms that had started up one month folded the next. They discovered programs were too expensive to develop, validate, and market. The educator was also experiencing

difficulty in getting students to complete programs–a motivational problem that wasn't to be solved until people like Homme (1968) made their contribution.

The simple truth of the matter was that teaching machines were recognized for what they really were: expensive page turners that cost entirely too much to start with and later to keep in repair. If they could track and record student responses and progress, they might replace a clerk charged with that responsibility.

During this period, the super teaching machine–the computer–was being tried out in a number of experimental-demonstration projects throughout the nation. The enormous expense of computer-assisted instruction (CAI) prevented its widespread use. Moreover, as was the case with the early teaching machines, the programs that went into the computer were of a short, demonstrational sort. And when more programs were written, they were not exchangeable between one make of computer and another.

But the cost of CAI has come down. For example, a terminal computer can now be purchased for less than $2,000, and this terminal can be put on line with one or more other computers at a cost between $200 and $600 per month. But then there is always a maintenance bill due quarterly.

CAI has particular value for special instructional purposes. For example, computers have great value in the training of physicians, for they can simulate medical cases which the student may never encounter in the clinics or hospital where he receives his practicum training. But with regard to CAI in prison educational programs, it is something not to expect–or even ask for.

What Hardware is Appropriate for ABE?

If you have functioning teaching machines and programs for them, use them. Students will learn. There is nothing intrinsically "bad" about these machines. They don't "mechanize" the student or teacher or the learning process. Nor do they promote "dehumanization"–certainly not to the extent that lock-step, talk-down instruction is likely to.

An area where hardware is all-but-required in ABE is in the teaching of reading. Visual aids, tape recorders, pacers, and tachistoscopes are essential if the extensive use of tutors is to be avoided. Even in the best reading labs, tutorial instruction and close monitoring will be necessary, but equipment can save considerable expense and time–matters of great importance to correctional ABE programs.

The Integration of Hardware and Software into an ABE System

Equipment and software programs are but two–albeit crucial–instructional contingencies in an individualized ABE system. Other important contingencies concern the individualization process (pinpoint diagnosing of deficiencies, for example) and the maintenance of a high level of accurate, reponding behavior, generally called *motivated* behavior.

Contingency Management Techniques

The contingent relationship between the materials and equipment, the response to them, and the consequences that follow is a special domain of educational technology called *contingency management* (Homme et al., 1968a, Clements & McKee, 1968).

Contingency management is defined as the systematic arrangement of reinforcing consequences of behavior, the objective of which, when applied to educational settings, is to achieve increased student performance. A contingency manager attempts to produce better student performance by establishing clear and dependable relationships between educational behavior (e.g., rate of learning and accuracy of responding) and the immediate results of that behavior.

Contingency Contracting

One contingency-management technique that has been successfully employed in many settings, including corrections, is the *performance* or *contingency contract*. A contingency contract is a clear, specific, and fair statement of the expectancies of two parties–the student and the learning manager. It is a statement of contingencies, namely, "If you do this, you will get this." It is a statement of work to be performed, usually in a given period of time. The contract can be viewed as a stimulus leading to a response followed by a consequence. Thus, it has the power to control behavior and at the same time to reinforce it. Reinforcement occurs upon task completion and the reporting by the student and manager (on the contract) of the fact that the task has been completed.

The contingency contract (see attached sample) may permit the learning manager to administer *points* contingent upon contract performance and completion. These points have a "cash-in" value (backup reinforcers) for money or privileges.

A contract is broken down into small segments or units to be mastered or achieved. Each unit has a value in its own right and can be viewed as a subcontract. The completion of the unit also provides a sense of "task completion" to the student–a powerful reinforcer

in itself. When the conditions of the contract are not met, there may be negative consequences, else responsibility and commitment will not be taught or taken seriously.

Progress Plotters

Another contingency-management technique is the progress plotter, an example of which is the *Efficiency Quotient* (E.Q.) graph (attached) developed by the Experimental Manpower Laboratory for Corrections at Draper Correctional Center. The E.Q. is derived by dividing the number of module tests passed by the number taken, times 100. This percentage, obtained for the sum tests of each contract, is then plotted on graph paper. The E.Q. not only provides a quick reference for performance, but the student can also be reinforced by maintaining the line on the graph--the "efficiency line"--at a certain level, say, at the 85 percent point.

The above contingency-management procedures are but a couple examples of many more procedures which are available or that can be devised. The essential point here is that an effective and efficient IPI System have built into it some systematic approach to contingency management. All three variables require thoughtful handling. Thus, careful selection of stimulus materials and equipment, of the response mode (rate, accuracy, duration, etc.) and of reinforcing consequences (money or privileges earned, progress feedback procedures, etc.)--all must be dealt with in a systematic fashion for effective learning. Less attention need be given to providing "synthetic" or extrinsic reinforcers if the IPI System is well structured and the materials themselves are intrinsically motivating, that is, if they are interesting and stimulating and meet a need of the learner which is obvious to him. A student in a vocational class in bricklaying, for example, readily seeks the skill in basic math which allows him to determine such things as how many bricks and how much time will be required for him to complete a job.

Still, the use of synthetic reinforcers may be necessary. Remember the fact that, for offenders, basic education was an early source of repeated failure and punishment--a condition they sought to relieve by avoiding school. So, it is frequently necessary to provide extrinsic reinforcers in order to generate motivation or interest. As a matter of fact, the offender may never *like* to learn ABE skills, but the use of contingency-management techniques will at least get him *through* the material he must acquire.

Though a particular learner may never really *like* to learn, it is, of course, true that the more powerful the reinforcer the more work that will be generated. One experiment (de Risi, 1971) being conducted now seeks to link parole with points earned in basic

education and with other contingencies as well. Correctional educators should find it very interesting to see how performance-contingent parole, incorporating basic education, is achieved. The significant fact here, of course, is that a step has been taken into one of the most crucial problems of corrections–creating a clear, realistic, and functional relationship between what takes place "inside" prison and what goes on "outside." This problem faces ABE programs in corrections as much as any other kind of in-prison training program.

Adult Basic Education Should Not Exist in a Vacuum

More often than not, adult basic education is taught without any attempt to relate it to the vocational goals of adults–whether they are inmates in a prison or students in "free-world" ABE programs. Yet, ABE classes flourish at night in high schools in every community in the nation. If the truth be known, most free-world students attend these classes for two basic reasons: to get a GED certificate and to overcome feelings of inferiority for having dropped out of school. These reasons are not strong enough in themselves for inmates to attend prison classes for long. They recognize the "phoniness" and unrelatedness of the requirement of the GED certificate to get and maintain a job, but they seek a GED because they are trapped like their free-world counterparts.

The regretful thing about the whole matter is that ABE programs, because their instructors come from the middle-class, college-striving culture, know little about the world of work and have little work experience other than teaching. And it is for these reasons that they can't very well relate basic education skills to buying and selling, working as an auto mechanic, or applying measurement to construction work.

This same criticism holds for many prison educators throughout the country, for they teach the rules of grammar as if they were the end-all, percentages and decimals with few examples of real-life applications, and science that will never be applied. So what is the important objective in prison ABE programs–honestly? A GED certificate is a "meal ticket," a "piece of paper society says you ought to have," a symbol of accomplishment. It's phony all right.

And what role do ABE materials and equipment play in this "Mickey Mouse" game? The publishers and machine makers reinforce the rule makers. Everybody is on the bandwagon to promote the GED as the *sine qua non* of all good, honest, free people, as a rite of passage to many fine things of society.

How can integration of life goals and occupation training be incorporated into the curriculum of a basic education learning center? Two steps are required. First, a task analysis of the occupation must be done, which process will reveal what basic education skills are required for which occupation. The second step involves two operations, namely, curriculum development and individualizing the instruction for each student according to the occupation he is either training for or interested in. These tasks are onerous, time-consuming, and quite technical. The need is not of course limited to correctional training; the need is nationwide for nearly all ABE programs.

Many ABE instructors work fairly closely with vocational trainers on this matter. They confer with each other in both general and specific ways with regard to meeting the basic education needs of the occupation and the specific deficiencies of individual students. This is good, but it doesn't go far enough. A national, well-funded effort is required. The logical group to sponsor such an endeavor is the federal government, perhaps the U. S. Office of Education. The sooner the better.

Summary and Conclusion

Little attention was deliberately given to consideration of the prisoner as a special type of learner with peculiar styles of learning or as one requiring unusual instructional materials and equipment. To have done otherwise would have, I believe, furthered the notion that the offender is different from the rest of the human population and that lawful "contingencies of reinforcement" (Skinner, 1968) simply do not apply. Such is happily not the case.

Certainly an IPI System in ABE must be tailored to a special situation, such as a correctional setting, and certainly reinforcers will, in some respects, differ from those available in free-society settings. But an important fact to remember when we are discussing current ABE programs is that they, as well as nearly all other in-prison training programs, are not static, rather the entire complex of training programs is moving toward the long-range goal of bringing the two worlds of prison and free society together. As prisons and the activities that go on in them begin to more and more simulate the general nature of free, human society, then will prison life and prison training begin to shed its artifice and begin to approach its goal of preparing men for functional, independent, and productive lives beyond "the walls."

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Homme, L. E., & Tosti, D. T. Contingency management and motivation. National Society for Programmed Instruction Journal, 1965, 4(7), 14-16.

Homme, L. E., & Csanyi, A. P. *Contingency contracting–a system for motivation management in education*. Albuquerque: Behavior Systems Division, Westinghouse Corporation, 1968.

Markle, S. M. *Good frames and bad–a grammar of frame writing*. (2nd ed.) New York: John Wiley & Sons, 1969.

McKee, J. M. Materials and technology of adult basic education for corrections. NSPI Journal, 1971, X(5), 8-12.

McKee, J. M. Contingency management in a correctional institution. Educational Technology, 1971, 11(4), 51-54.

Skinner, B. F. *The technology of teaching*. New York: Appleton-Century-Crofts, 1968.

LIST OF RESOURCES
FOR ADULT BASIC EDUCATION

Catalogs and Guides

Hendershot, C. H. *Programmed learning. a bibliography of programs and presentation devices.* Bay City, Mich.: Carl H. Hendershot (Supplemented).

The catalog comes in two volumes. The various available programmed instructional materials are listed by subject in one volume and by publisher in the other. Each volume also gives the approximate number of hours required for completion, the number of frames in the program, the grade level, list prices, and "other information" for each entry.

The catalog is intended to encourage selective and proper use of programmed learning or programmed instruction. The listings do not constitute a recommendation regarding quality or adherence to principles of programming.

Automated education handbook. Detroit: Automated Education Center (Supplemented).

A basic reference book in eight sections, headed as follows: (1) General, (2) Programmed Instruction, (3) Language Laboratories, (4) Computerized Educational Technology, (5) Administrative, (6) Curricular Considerations, (7) University Computer Centers, and (8) Appendices.

The *Automated Education Letter*, published monthly, contains information on the latest developments in the field, new devices and machines, new instructional techniques and materials, conferences and conventions to be held in the near future, and programs that have instituted new techniques, media, and methods of instruction. (A service of Automated Education Handbook.)

Programmed instruction guide. Newburyport, Mass.: Entelek Incorporated (Supplemented).

The guide gives "recommendations for reporting the effectiveness of programmed instruction materials," a list of bibliographies of programmed teaching material, a list of periodicals, a list of publishers, a list of program devices, a coded index of programs, and a "data bank."

Journals and Publications

Newsletter and quarterly of the National Society for Programmed Instruction. Washington, D.C.: Catholic University.

Reports the use and development of programmed instruction in business, industry, the governmental services, and all levels of education.

Educational technology. Englewood Cliffs, N. J.: Educational Technology Publications, Inc.

Articles on new materials and techniques oriented to schools, industry, and higher education.

Training in business and industry. New York: Gellert Publishing Corp.

Articles on training practices, techniques, materials and equipment. Includes articles on programmed instruction.

Educate. New York: Gellert Publishing Corp.

A magazine for America's educational leaders. Articles on new materials, educational media, and instructional developments–including programmed instruction.

Audio-visual communications review. Washington, D. C.: Department of Audio-Visual Instruction. National Education Association.

Articles and reviews of publications of interest to those using programmed instruction. Vol. 14, No. 1, Spring, 1966, was devoted to programming.

Audio-visual instruction. Washington, D. C.: Department of Audio-Visual Instruction. National Education Association.

A wide range of articles with information regarding educational media, materials, techniques, and instructional developments.

Research in Education. Washington, D. C.: National Center for Educational Communication, Office of Education, U. S. Department of Health, Education, and Welfare.

A monthly abstract journal announcing recently completed research and research-related reports in the field of education.

Agencies and Organizations

Adult Education Association of U.S.A.
1225 19 Street, Northwest
Washington, D. C. 20036

Area Manpower Institute for Development of Staff (AMIDS)
One located in each of the following cities: Montgomery, Ala., Washington, D. C., Providence, R. I., Detroit, Mich., Portland, Ore., Los Angeles, Calif., Oklahoma City, Okla.

AMIDS provides technical assistance and staff development.

ERIC Clearinghouse on Adult Education
Syracuse University
Syracuse, New York 13210

ERIC Clearinghouse on Educational Media and Technology
Stanford University
Stanford, California 94305

Division of Adult Education
U. S. Office of Education
Department of Health, Education, and Welfare
Washington, D. C.

Experimental Manpower Laboratory for Corrections
Rehabilitation Research Foundation
Elmore, Alabama 36025

Northwest Regional Educational Laboratory
500 Lindsay Building
710 Second Avenue, Southwest
Portland, Oregon 97204

U. S. Bureau of Prisons
HOLC Building
101 Indiana Avenue, Northwest
Washington, D. C. 20001

CONTINGENCY CONTRACT

Name ______________________ Date Started ______________ Contract No. ____________

Date Completed ______________

Module No.	Name of Course	Frames or Pages		Point Value		Test Score	Form
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Manager

EFFICIENCY QUOTIENT

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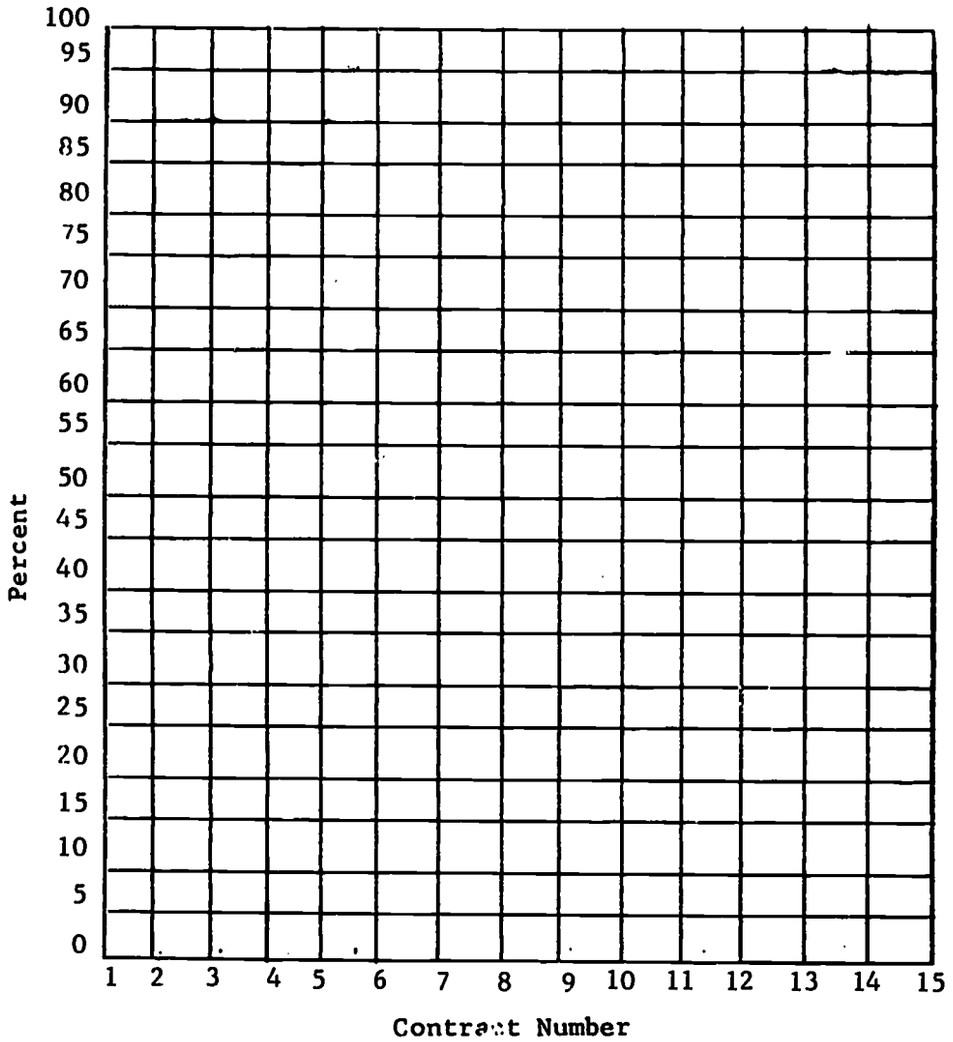

$$\text{Efficiency Quotient} = \frac{\text{Test Passed}}{\text{Test Taken}} \times 100$$